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Impact of Monetary Policy on Unemployment in Nigeria

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Abstract

This research work investigates the impact of monetary policy on unemployment reduction in Nigeria. This study presented an empirical analysis of this impact spanning the period of 1990 through 2023 and used secondary data obtained from the CBN Statistical Bulletin and World Development Indicators. The methodology employed includes the ADF test for unit root, the Johansen Test for Co-integration, the Ordinary Least Square (OLS) Technique. The unit root test results show that the variables are of the same order of stationary. The co-integration test results show that there exists long run relationship between the variables in the model. The OLS results shows that all the variables have a positive and significant relationship with unemployment in Nigeria except population and interest rate which have a negative and significant relationship with unemployment in Nigeria. In light of the empirical findings, it is imperative for policymakers to adopt a multifaceted approach to address the economic challenges of inflation, exchange rates, interest rates, and unemployment. First and foremost, priority should be accorded to inflation control. Additionally, exchange rate policies should be structured to foster stability, thereby reducing currency volatility and speculative pressures. The inverse relationship between interest rates and unemployment underscores the potential of lowered interest rates. Lastly, given the observed connection between unemployment and a broad money supply, though insignificant, policymakers should shift their focus towards enhancing the quality of employment by implementing programs that bolster the skills and employability of the labour force.

Keywords: *Unemployment, Monetary policy, Money supply*

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Background to the Study

Monetary policy plays a pivotal role in determining economic stability on a global scale. The specific objectives of monetary policy are clearly defined within the legislative frameworks that establish Central Banks. This foundational instrument for economic stabilization involves a range of measures implemented by the central bank, with the overarching goal of regulating and supervising the quantity, cost, and availability of currency (credit) in circulation. These measures are undertaken to achieve predefined macroeconomic goals related to both internal and external equilibrium (CBN, 2011). Monetary policy essentially revolves around the manipulation of financial instruments by monetary authorities to influence the economic decisions of various stakeholders, all with the ultimate aim of achieving comprehensive macroeconomic equilibrium (Ononugbo, 2012). It is important to note that the specific objectives and focal points of monetary policy may evolve over time, depending on the prevailing economic development level and conditions within a given nation. The selection of appropriate instruments to achieve these objectives is contingent upon these contextual variables and other relevant factors. These instruments encompass a range of strategies, including but not limited to the bank rate, open market operations, variable cash reserve requirements, and selective credit controls. Over time, the emphasis on the techniques and instruments used in the execution of monetary policy has evolved (CBN, 2014).

Monetary policy is conventionally categorized as either expansionary or contractionary. In the context of expansionary monetary policy, the central bank aims to increase the overall money supply in the economy rapidly, with the underlying purpose of stimulating the domestic economy and reducing unemployment. Conversely, contractionary monetary policy involves raising interest rates as a counter measure to combat inflation (Engler, 2011). Nigeria's monetary policy can be divided into two broad administrative frameworks: direct monetary policy instruments, commonly referred to as qualitative instruments, and quantitative instruments, regarded as general tools. The direct method of control, prevalent from 1960 to 1993, was characterized by the imposition of quantitative limits on credits, administered interest and exchange rates, as well as the allocation of credits at the aggregate and sectoral levels, along with stabilization securities (Obadan, 2006). Under this system, the economy was divided into preferred and less preferred sectors, with banks required to allocate a specified proportion of their credits to various sectors. The rationale behind this approach was to moderate aggregate demand by regulating the volume and cost of credit entering the economy (Oyakhilomen and Rekwot, 2014). Key instruments used during this period included the administrative setting of the Minimum Rediscount Rate (MRR), cash reserve requirements, liquidity ratios, stabilization securities, and transfers of federal government deposits, including those of ministries and parastatals, to and from the central bank. The primary monetary objective during this era revolved around mitigating inflation rates, alleviating pressures on the external sector to achieve a sustainable balance of payments, and stabilizing the naira exchange rates. Monetary management under the direct control system encountered numerous constraints, resulting in a repressed financial market and misallocation of resources within the banking sector (Sanusi, 2009).

In an effort to mitigate the distortions and inefficiencies prevailing in the financial system, a market-oriented approach was introduced. The indirect method of control relies on market-based instruments and requires the development of a robust market infrastructure for effectiveness. Two distinct administrative eras emerged during the indirect approach to monetary management: indirect control during the pre-consolidation era (1993-2005) and indirect control in the post-consolidation era (2006 to the present). Instruments used during the pre-consolidation era included Open Market Operations (OMO) conducted through the issuance of Nigerian Treasury Bills (NTB) and Certificates, CBN Bills, and Special NTBs, as well as reserve requirements, liquidity ratios, and the movement of government deposits to and from the Central Bank (Okafor, 2009). The post-consolidation era introduced the Monetary Policy Rate (MPR) to replace the MRR, along with a standing lending and deposit facility. Other instruments used during this period included Open Market Operations (OMO), cash reserve requirements, and foreign exchange swaps (Borio, 2014). The overarching strategy aimed to regulate aggregate demand by controlling interest rates and the money supply.

Unemployment, as defined by the Nigerian National Bureau of Statistics (NBS, 2019), refers to the proportion of individuals within the labor force (excluding the entire economically active population or the entire Nigerian populace) who actively sought employment but remained jobless for a minimum of 24 hours during the reference period, relative to the total presently active population. This definition includes individuals aged 15 to 64 who were available for employment during the reference period, actively sought employment, yet remained unemployed (NBS, 2015; Olarewaju, 2015; Kale and Doguwa, 2015). According to (Doğrul and Soytas, 2010), unemployment presents a significant macroeconomic challenge due to its multifaceted social and economic consequences, requiring policymakers to identify the most influential factors responsible for it. When the central bank pursues an expansionary monetary policy, its primary objective is to stimulate the domestic economy and reduce unemployment. This policy stance is rooted in society's preference for low levels of unemployment, as it entails significant psychological and societal costs. One of the fundamental goals of contemporary governance is the reduction of unemployment and the creation of a conducive environment for investment, thereby generating employment opportunities and ensuring price stability through the effective implementation of monetary policies.

Monetary policy exerts considerable influence over interest rates, which, in turn, impact investment decisions made by businesses. When the CBN chooses to raise interest rates as a measure to counter inflation, the cost of borrowing for businesses increases. This can potentially deter investments in new ventures and expansion, leading to an economic slowdown and job layoffs (Ayinde et al., 2019). Exchange rates, an area affected by monetary policy, can significantly affect the competitiveness of Nigerian exports. A stronger Naira, resulting from tighter monetary policy, can make Nigerian exports more expensive on the international stage, potentially reducing the demand for these goods. This situation can have a detrimental impact on sectors reliant on exports, ultimately resulting in job losses (Ogunmuyiwa and Ekone, 2019). Monetary policy's influence extends to the availability of credit within the economy. Stringent monetary policy can lead to higher interest rates and stricter lending requirements, making it more challenging for small and medium-sized

enterprises (SMEs) to secure financing. Given that SMEs are significant employers in Nigeria, reduced access to credit can hinder their growth and job creation (Iyoha and Oriakhi, 2019). The overarching objective of monetary policy is inflation control, as high inflation can erode the real wages of workers. The rapid rise in prices reduces the purchasing power of wages, leading to a decline in living standards. This phenomenon can be seen as a latent form of unemployment, where individuals remain employed but struggle with financial hardship due to rising prices (Nwaogwugwu and Ikechukwu, 2019).

In summary, the complex relationship between monetary policy and unemployment in Nigeria encompasses various channels through which monetary policy can either stimulate job creation or lead to job losses. It is against this backdrop that this study aims to examine the impact of monetary policy on unemployment in Nigeria. This study further seeks to shed more light on the dynamic relationship by investigating the response of unemployment in the face of monetary shocks from the era of controlled interest rate to the liberalized era. Based on Fasanya et al. (2013) who posited that monetary policy innovations have real and nominal effects on economic parameter, this study incorporates money supply and investment for analyzing unemployment dynamics in Nigeria. Also, included in the investigations is the causality relationship between monetary policy and unemployment in Nigeria. In this context, and to the best of our knowledge, this study presents significant innovation to the literature and is relevant not only to policy makers but also to academia. The rest of the paper is organized as follows: Section 2 presents relationship between monetary policy and unemployment in Nigeria; Section 3 showcase the theoretical Underpinning of the Study and the reviews of related literature; Section 4 dealt with the empirical framework and econometric models; Section 5 undertakes the empirical analyses and presents results; and Section 6 concludes the paper with policy implications and recommendations.

Relationship Between Monetary Policy and Unemployment in Nigeria

Monetary policy, as delineated by the Central Bank of Nigeria (CBN), encompasses the meticulous regulation of the money supply and interest rates, aimed at attaining specific economic objectives, notably the preservation of price stability and the fostering of sustainable economic growth. A paramount instrument within the purview of monetary policy is the deliberate adjustment of interest rates, especially the policy rate, which exerts a pivotal influence on the cost of borrowing, thereby engendering consequential effects on expenditure patterns and investment determinations (CBN, 2018). Nigeria grapples with persistent unemployment challenges, characterized by elevated rates among both the youth and the adult populace. A research endeavor undertaken by Adeniji et al. (2019) elucidated that Nigeria's unemployment quandary is underpinned by a plethora of structural variables, comprising population expansion, skill incongruities, and an insufficiency of employment prospects in critical sectors. Furthermore, inflationary pressures and exchange rate oscillations, which are subject to the sway of monetary policy, can also exert an impact on the unemployment scenario (Ajide, 2019).

The nexus between monetary policy and unemployment in Nigeria can be apprehended through the prism of the Phillips curve paradigm, which posits a trade-off between inflation

and unemployment. The adoption of a contractionary monetary policy stance by the central bank, characterized by the elevation of interest rates to counteract inflationary pressures, can potentially engender diminished economic vitality and a contraction in investment, thereby potentially accentuating the levels of unemployment (Iyun, 2019). Conversely, an expansionary monetary policy posture, typified by the reduction of interest rates, can stimulate economic expansion and the generation of employment opportunities.

Nonetheless, the efficacy of monetary policy as a mechanism for curbing unemployment in Nigeria is contingent upon inherent constraints. Structural impediments, such as inadequate infrastructure, corruption, and a feeble business environment, can obstruct the transmission channels of monetary policy interventions (Mishkin, 2018). Furthermore, Nigeria's pronounced dependence on revenue derived from oil exports renders the nation susceptible to external vicissitudes, which can have repercussions on unemployment levels (Omojimite et al., 2018). In summation, the interrelationship between monetary policy and unemployment in Nigeria is multifaceted and subject to a multiplicity of determinants. While monetary policy can assume a role in mitigating unemployment through its influence on economic activity and investment, it must be supplemented by comprehensive structural reforms and policy initiatives that address the root causes of unemployment. The effectiveness of monetary policy in Nigeria is also contingent upon its capacity to navigate external disruptions and surmount structural challenges. Policymakers are thus compelled to adopt a holistic approach in addressing the issue of unemployment in Nigeria, addressing both monetary policy considerations and broader macroeconomic concerns.

Theoretical Underpinning of the Study and Review of Related Literatures

Different studies have been conducted on monetary policy and its impacts on the unemployment of different economies. However, some such studies have been selected as essential for this research. Those reviewed in this study are the Philips Curve theory and the monetarist theory. The Phillips Curve theory, originating from the work of A.W. Phillips in the 1950s, constitutes an economic paradigm investigating the interplay between inflation and unemployment within an economic framework. This theory posits an inverse correlation between these two variables, signifying that during periods of low inflation, unemployment tends to be elevated, and conversely, during periods of high inflation, unemployment tends to be diminished. This correlation is frequently represented as a trade-off, necessitating policy decisions that weigh the dual objectives of inflation control and unemployment reduction.

The nexus between monetary policy and unemployment, as delineated by the Phillips Curve theory, carries considerable significance. Monetary policy, under the purview of Central Banks, encompasses the manipulation of a nation's money supply and interest rates. When central banks augment the money supply and reduce interest rates, it catalyzes economic activity, thereby engendering a reduction in unemployment. This phenomenon transpires because businesses encounter more favorable borrowing conditions, which can, in turn, precipitate job creation and a decline in the unemployment rate.

Conversely, when central banks adopt a contractionary monetary policy stance by diminishing the money supply and raising interest rates, it typically exerts a dampening effect on economic expansion while concurrently elevating unemployment. Such actions are undertaken to combat burgeoning inflation, as an overheated economy tends to drive up prices. Consequently, the Phillips Curve theory posits that a trade-off exists between inflation and unemployment within the context of monetary policy. Policymakers must adeptly navigate this trade-off, as endeavors to quell inflation may yield an increase in unemployment and attempts to curtail unemployment may incite inflationary pressures. In practical terms, central banks aspire to strike an equilibrium between these two objectives to sustain stable and robust economic growth.

Monetarism, a school of thought in economics closely associated with the works of Milton Friedman, emphasizes the critical role of monetary policy in influencing economic outcomes, particularly inflation and unemployment. At its core, monetarism posits that the quantity of money in an economy plays a central role in determining the overall price level and, by extension, the rate of inflation. According to this theory, if the central bank increases the money supply at a faster rate than the growth of real output, it will lead to inflation, while reducing the money supply growth below the rate of real output expansion will result in deflation. The link between monetary policy and unemployment in monetarism is primarily mediated through the concept of the "natural rate of unemployment." Monetarists argue that in the long run, the level of unemployment in an economy tends to revert to a specific natural rate, which is determined by structural factors such as labor market conditions, government policies, and the efficiency of the economy. Deviations from this natural rate are seen as temporary and cyclical in nature.

Monetarists contend that attempts by the central bank to reduce unemployment through expansionary monetary policy, such as lowering interest rates or increasing the money supply, will only lead to higher inflation in the long run. In their view, while expansionary monetary policy might temporarily lower unemployment below its natural rate, it is unsustainable and ultimately counterproductive. They argue that the long-term relationship between inflation and unemployment, known as the Phillips curve, is not exploitable through monetary policy in the way suggested by Keynesian economics. In summary, monetarist theory links monetary policy to unemployment by emphasizing that while central banks can influence short-term economic fluctuations, such as lowering unemployment temporarily through monetary expansion, their primary role should be to maintain price stability by controlling the money supply growth. Monetarists believe that deviations from the natural rate of unemployment caused by monetary policy are short-lived, and efforts to maintain low unemployment through sustained monetary stimulus will lead to undesirable levels of inflation in the long run. Thus, they advocate for a rule-based approach to monetary policy focused on a stable and predictable growth rate of the money supply as a means to ensure overall economic stability.

Attan, Effiong, and Okon (2019) investigated the influence of monetary policy as a veritable tool for tackling the problem of unemployment in Nigeria. The study used time series data ranging from 1981 to 2017. The ordinary least squares (OLS) method was used in the analysis.

The Augmented Dickey-Fuller (ADF) unit root test was employed in testing the stationarity property of the series and revealed that all the variables were stationary at first difference. This therefore necessitated the test for cointegration using the Johansen cointegration test of which both the Trace statistic and Max-Eigen statistic showed 2 and 1 cointegrating equation(s) respectively. This justified the use of the Error Correction Mechanism (ECM) in the study. The findings of the study showed that monetary policy rate (MPR), money supply (MS), Gross Domestic Product (GDP), and Credit to the private sector (CPS) had an inverse and significant influence on unemployment in Nigeria within the study period. Also, the existence of cointegrating equations showed that there is a long-run relationship between unemployment and the explanatory variables used in this study. The study recommended that emphasis should be laid on aggressively pursuing entrepreneurial development and increased productivity by focusing on investment, employment generation, and economic growth that has a mechanism to trickle down to the masses.

Amasomma (2015) investigated the efficacy of monetary policy variables in reducing the unemployment rate in Nigeria using data spanning from 1970-2013. The study utilized a multiple regressions (OLS) approach. Error correction modeling was used to examine the effect of some key monetary policy variables on unemployment in Nigeria. Evidence from the result showed that the exchange rate and consumer's price index are the only monetary policy variables that influence the unemployment rate while others do not. The results equally x-rayed that there is a unidirectional causality between the monetary policy variable and the unemployment rate which runs from the exchange rate to unemployment. The study recommended that monetary authorities via the Central Bank of Nigeria should ensure some reasonable monetary policy stands that would be suitable for reducing interest rates in the economy. Furthermore, monetary authorities should ensure relatively stable prices of goods and services which would guarantee sustainable investment that can enhance employment opportunities in the country.

Ekwe (2018) investigated the relationship between monetary policy variables (Treasury bill rate, money supply, monetary policy rate, exchange rate) and unemployment using the regression method of analysis. The unit root (Augmented Dickey-Fuller) test was used to determine the stationarity of the variables. From the co-integration analysis and the error correction model (ECM), the study found that the Treasury bill rate and money supply have a positive relationship with unemployment in Nigeria and that there is a negative relationship between the monetary policy rate and exchange rate with unemployment in Nigeria. The study concluded that there is a significant negative impact of monetary policies on Nigeria's unemployment, which if not checked will continue to hinder the success of the fight against poverty in the nation. The study recommended among others that the regulating bodies should employ all standard methods of checking inflation by targeting equilibrium between money supply, Treasury bill rate, and exchange rate, and maintaining the same.

Onwuka (2022) empirically examined the impact of fiscal and monetary policy on the unemployment rate using data between the periods 1981 to 2020 using the Vector Autoregressive (VAR) model as the major statistical technique of analysis. The data used for the

study were annual time series secondary data sourced from the Central Bank of Nigeria Statistical Bulletin (CBN) and the National Bureau of Statistics (NBS). From the findings, the coefficient of determination (R2) was 0.652 which shows that about 65 percent of variations in the unemployment rate were explained by the independent variables. Also, its adjusted counterpart is 0.602 and it shows that about 60 percent growth in unemployment rate can be explained by the independent variables. The unit root test results indicated that all the variables were stationary at the first difference and the co-integration test confirmed a long-run relationship among the variables. The F-stat value of 4.445 confirms that the overall test is significant. The AR root test confirmed that the estimated model is stable. Also, the serial correlation LM test and heteroskedasticity test confirmed that there is no autocorrelation and heteroskedasticity in the model. The findings of the study showed that government expenditure and interest rate have negative and significant effects on the unemployment rate at lag period 2. Government tax was found to be negative and insignificant at lag period 2. The money supply was found to have a positive and significant lag period 1. By implication, the findings of the study showed that government expenditure, money supply, and interest rate are major determinants of the unemployment rate in Nigeria since they were found to be statistically significant. Also, the impulse response function of unemployment showed that the unemployment rate has a negative relationship with its past values from periods except in the first, 2nd, 3rd, 4th, and 5th periods. Furthermore, from the forecast error variance decomposition (FEVD) the highest innovation was due to government tax and money supply, while the shock of government expenditure and interest rate in Nigeria were the lowest over the periods. The study concluded that there is a need for diverse strategies that will be targeted towards employment creation in Nigeria. Thus, an expansionary fiscal and monetary policy should be encouraged to support employment generation in the country.

Adigwe, Echekoba, and Onyeagba (2015) in their paper examined the impact of monetary policy on the Nigerian economy, in doing this, the Ordinary Least Square Method (OLS) was used to analyze the data between 1980 and 2010. The result of the analysis showed that monetary policy represented by the money supply exerts a positive impact on economic growth but a negative impact on the rate of inflation. Essien, Garba, Arigo, Kufre, Suleiman, Ojegwo, and Ogbuehi (2016) examined the link between unemployment and monetary policy in Nigeria using a vector autoregressive (VAR) framework for the period 1983 – 2014. The paper investigated the effect of structural change by identifying three structural breakpoints and incorporating them into the VAR model as dummy variables. The results showed that a positive shock to the policy rate raises unemployment over a 10-quarter period. In addition, all the variables used as proxies in the model jointly Granger cause unemployment, implying the existence of a dynamic relationship between monetary policy and unemployment in Nigeria.

Tonprebofa (2019) evaluated the dynamics of monetary policy and inflation in Nigeria. Monthly data from 2009-2017 were used to estimate the model derived. The Augmented DickeyFuller (ADF) unit root test, Johansen Cointegration test, and Error Correction model (ECM) were adopted. The findings concluded that money supply, exchange rate, monetary policy rate, treasury bills rate, reserve requirement, and liquidity ratio have a significant and effective impact on the inflation rate. Srithilat and Sun (2017) examined the impact of

monetary policy on economic development by using annual time series data from 1989-2016. Johansen Cointegration and Error Correction Model was employed to analyze the association between variables. The findings showed that money supply, interest rate, and inflation rate negatively affect the real GDP per capita in the long run and only the real exchange rate has a positive sign. The error correction model result indicated the existence of short-run causality between money supply, real exchange rate, and real GDP per capita.

Idris (2019) examined the relationship between monetary policy and economic growth in Nigeria using time series data covering the period from 1980 to 2017. The study employed the Cointegration test and the Ordinary Least Square (OLS) technique with the view to estimating the model coefficients and showcasing the policy nexus between the variables. The result indicates the existence of a long-run relationship between monetary policy indicators and economic growth. Further empirical findings showed that money supply has a positive effect, while both exchange rate and interest rate have a negative effect on the real GDP.

Ayodeji and Oluwole (2018) examined the impact of monetary policy on economic growth in Nigeria by developing a model that can investigate how the monetary policy of the government has affected economic growth using multi-variable regression analysis. They proxied the variables of monetary policy instruments to include Money Supply (MS), Exchange Rate (ER), Interest Rate (IR), and Liquidity Ratio (LR). Economic growth was represented by Gross Domestic Product (income) at constant prices. Error Correction Model was introduced in the estimation to have a prudent model. From the result, two variables (money supply and exchange rate) had a positive but insignificant impact on economic growth. Measures of interest rate and liquidity ratio, on the other hand, had a negative but highly significant impact on economic growth. In addition, the Engle-Granger co-integration test was done and showed the existence of a long-run relationship between monetary policy and economic growth in Nigeria. The results showed the existence of a uni-directional causality between money supply and economic growth, with economic growth granger causing liquidity ratio and exchange rates while a bi-directional causality exists between interest and economic growth.

Finally, Egbulonu and Amadi (2016) examined the relationship between fiscal policy and the unemployment rate in Nigeria for the period 1970 to 2013. Data for the study were sourced from the National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN) Statistical Bulletin (various editions) and consists of Government Expenditure, Government Debt Stock (as a proxy for Government borrowing), Government Tax Revenue and Unemployment rate. They found a negative relationship between fiscal policy tools (government expenditure and government debt stock) and the unemployment rate in Nigeria while government tax revenue exhibited a positive relationship with the unemployment rate. This means that an increase in tax rate reduces employment in Nigeria. The results also reveal that there exists a long-run equilibrium relationship between unemployment and fiscal policy in Nigeria.

Empirical Framework and Econometric Modeling with Data Sources

The study employs the econometric technique. Since the study is of time series, some pre-test assessments will be carried out. For instance, the unit root test is important as it allows us to

examine whether a time series data is stationary or not, to avoid spurious regression. Again, a co-integration test is carried out to ensure the long run relationship of the variables while the appropriate econometric test will be determined by the unit root results. Hence, for this study, there is a need for the results to be evaluated based on the economic a'priori criteria, statistical criteria and econometric criteria. The study used secondary data obtained from the CBN Statistical Bulletin and World Development Indicators. The study covered a period of 33 years (1990 to 2023). The data were subjected to the Augmented Dicker Fuller stationarity test to determine the best suitable econometric tool for analyses. The Ordinary Least Square (OLS) technique was used for the model estimation.

To evaluate the impact of monetary policy on unemployment in Nigeria, we specify the functional model, which is given as follows:

UNPR = f (GFCF, BMS, INF, EXR, INTR POP,) ……………………… ....(1)

In its mathematical form, the model is presented as follows:

$UNPR = \beta_o + \beta_1 GFCF + \beta_2 BMS + \beta_3 INF + \beta_4 EXR + \beta_5 INTR + \beta_6 POP$ ………… ......(2)

The model when specified in its econometric form becomes:

$UNPR = \beta_o + \beta_1 GFCF + \beta_2 BMS + \beta_3 INF + \beta_4 EXR + \beta_5 INTR + \beta_6 POP + U_t$................(3)

Where;

UNPR = Unemployment Rate
GFCF = Gross Fixed Capital Formation
BMS = Broad Money Supply(M2)
INF = Inflation Rate
EXCR = Exchange Rate
INTR = Interest Rate
POP = Total Population
β_o = Intercept or Constant term
β_1 - β_5 = Parameters to be estimated. They measure the effect of the independent variables on the dependent variable

A' priori expectation; $\beta_1 - \beta_5 < 0$ and $\beta_6 > 0$
On the ground of a' priori, the value of β_1 - β_5 is expected to be negative while β_6 is expected to be positive.
Ut = Stochastic error term which takes care of other variables not computed in the model.

The null hypothesis of no cointegration among variables in equation 4 can be tested as
H0: $\beta 1 + \beta 2 + \beta 3 + \beta 4 + \beta 5 + \beta 6 = 0$ against the alternative hypothesis of
HI: $\beta 1 \neq \beta 2 \neq \beta 3 \neq \beta 4 \neq \beta 5 \neq \beta 6 \neq 0$

Log Form of the Model

$LUNPR = \beta_o + \beta_1 LGFCF + \beta_2 LBMS + \beta_3 LINF + \beta_4 LEXR + \beta_5 LINTR + \beta_6 LPOP + U_t$ …….(4)

The variables, unemployment rate, total population, broad money supply, inflation rate, exchange rate, interest rate, and gross fixed capital formation will be logged for the estimation procedure and descriptive analysis of the data. The log transformation of a variable helps to scale down variables and for easy interpretation in elasticity.

Empirical Analysis, Results and Discussion
Descriptive Statistics.
The table below shows the median, maximum, and maximum standard deviation, skewness, kurtosis, and Jaque-Bera test for the normality of the Model variables. The mean values simply tell us the average value of each of the variables. The descriptive statistics result above presents the mean of unemployment rate, total population, broad money supply, inflation rate, exchange rate, interest rate, and gross fixed capital formationas 4.120188, 2.604159, 17.93508, 18.06084, 137.8190, 18.94381 and 28.22431 respectively. The media values tell the middle value of each of the variables. The Median variable taken from the highest to the lowest value falls on broad money supply with the value of15.84434.

The exchange rate takes the maximum value of 401.1520, while the total population has the minimum mean value of 2.406363from the given observation. The standard deviation shows that the degree of variability of the unemployment rate, total population, broad money supply, inflation rate, exchange rate, interest rate, and gross fixed capital formation, is lower than their various mean. This implies that the series is more spread out.

The skewness results below show that the unemployment rate, broad money supply, inflation rate, exchange rate, interest rate, and gross fixed capital formation are positively skewed. This implies that the distribution has a long right tail and mean, and median values are greater than the mode for each variable; also, it shows that the total population, is negatively skewed implying that the distribution has a long-left tail and mean, and median values are greater than the mode for the variable. The Kurtosis of the unemployment rate, inflation rate, and interest rate is greater than 3 which implies that the distribution is assumed to be peaked (leptokurtic) relative to normal while the total population, broad money supply, exchange rate, and gross fixed capital formation is less than 3 (platykurtic), suggesting that their distributions were flat relative to a normal distribution. The Jarque–Bera statistics show that the series is normally distributed since the p-values of all the series are not statistically significant at the 5% level. Thus, informing the acceptance of the null hypothesis that says each variable is normally distributed.

Table 1: Summary Descriptive Statistics

	UNPR	POP	BMS	INF	EXR	INTR	GFCF
Mean	4.120188	2.604159	17.93508	18.06084	137.8190	18.94381	28.22431
Median	3.899000	2.588849	15.84434	12.70720	128.9370	17.87167	26.45535
Maximum	5.999000	2.764062	27.37879	72.83550	401.1520	31.65000	53.12219
Minimum	3.700000	2.406363	9.063329	5.388008	8.038285	11.48313	14.16873
Std. Dev.	0.602057	0.100915	6.071568	16.36508	106.9853	3.889110	11.38213
Skewness	2.125584	-0.084493	0.082702	2.170086	0.792016	1.139878	0.416879
Kurtosis	6.487088	1.837692	1.374326	6.633360	2.960799	5.089460	2.067312
Jarque-Bera	40.30962	1.839355	3.560233	42.71787	3.347592	12.75085	2.086746
Probability	0.000000	0.398648	0.168619	0.000000	0.187534	0.001703	0.352265
Sum	131.8460	83.33308	573.9225	577.9468	4410.210	606.2020	903.1778
Sum Sq. Dev.	11.23666	0.315697	1142.782	8302.294	354821.2	468.8805	4016.137
Observations	33	33	33	33	33	33	33

Source: Authors computation (2023)

Test for Stationarity

The Augmented Dickey-Fuller (ADF) unit root test was performed to ascertain the order of integration. The results of the stationarity test are presented in Table 1

Table 2: Stationarity Test Results

Variables	**Order of Integration**	**Critical Values**			**ADF Statistics**	**Prob.**
		1%	**5%**	**10%**		
Δ (UNPR)	I (1)	-4.296729	-3.568379	-3.218382	-5.001276	0.0018
Δ(POP)	I (1)	-4.339330	-3.587527	-3.229230	-3.711065	0.2402
Δ(INTR)	I (1)	-4.296729	-3.568379	-3.218382	-6.799772	0.0000
Δ(INF)	I (1)	-4.296729	-3.568379	-3.218382	-4.427032	0.0074
Δ(GFCF)	I (1)	-4.296729	-3.568379	-3.218382	-4.318085	0.0095
Δ(EXR)	I (1)	-4.296729	-3.568379	-3.218382	-4.141281	0.0143
Δ(BMS)	I (1)	-4.296729	-3.568379	-3.218382	-4.414987	0.0076

Source: Author's computation (2023).

Note:

Δ= Difference operator

I(d) = Numbers of times of integration.

Levels= 10%, 5%, 1% levels of significance

The table above, reveals that all the series are stationary; hence has no unit root. Model estimation relating to time series data that are not stationary is sure to produce unreliable regression results. Unemployment rate, total population, broad money supply, inflation rate, exchange rate, interest rate, and gross fixed capital formation were all stationary at first difference. As can be seen, the ADF statistic values are greater than critical values for each of

the significance levels. The unit root test result shows that the order of integration of the variables is 1(1), as such the most appropriate model to be adopted in analyzing data remains the Ordinary Least Square (OLS) Model and the appropriate co-integration method to be adopted is Johansen test for co-integration.

Johansen CO-Integration Test

Under the Johansen Co-integration test, Co-integration is said to exist if the values of computed Eigenvalues are significantly different from zero or if the trace statistics are greater than the critical value at a 5 per cent level of significance. The results of the co-integration in Table 3 below indicated a co-integrating equation. This is because trace statistics is greater than the critical value at a 5 per cent level of significance in all of the hypothesized equations.

Table 3: Johansen Co-Integration Test Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.876657	204.0393	125.6154	0.0000
At most 1 *	0.808233	141.2558	95.75366	0.0000
At most 2 *	0.737625	91.71156	69.81889	0.0004
At most 3 *	0.600689	51.57212	47.85613	0.0215
At most 4	0.402124	24.03172	29.79707	0.1991
At most 5	0.168763	8.600585	15.49471	0.4036
At most 6	0.096831	3.055378	3.841466	0.0805
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Authors computation (2023).

Ols Estimates

Table 4: Ols Estimates Results

Dependent Variable: UNPR
Method: Least Squares
Date: 10/22/23 Time: 01:21
Sample: 1990 2023
Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POP	-1.408989	0.345081	-4.083063	0.0004
BMS	0.010959	0.006333	1.730323	0.0959
INF	0.003792	0.001588	2.388053	0.0248
EXR	0.005079	0.000426	11.92948	0.0000
INTR	-0.021695	0.008121	-2.671490	0.0131
GFCF	0.027599	0.004014	6.875234	0.0000
C	6.456468	1.012561	6.376377	0.0000

R-squared	0.968673	Mean dependent var	4.120188
Adjusted R-squared	0.961155	S.D. dependent var	0.602057
S.E. of regression	0.118661	Akaike info criterion	-1.234456
Sum squared resid	0.352009	Schwarz criterion	-0.913826
Log likelihood	26.75130	Hannan-Quinn criter.	-1.128177
F-statistic	128.8395	Durbin-Watson stat	2.156381
Prob(F-statistic)	0.000000		

Source: Author's computation (2023).

The obtained R-squared and Adjusted R-squared values, 0.968673 and 0.961155 respectively, indicate that the explanatory variables collectively account for over 97% and 96% of the variability observed in the dependent variable. Furthermore, the F-Statistics p-value, which is less than 5% (specifically 0.000000< 0.05), signifies the statistical significance of the F-Statistics. Consequently, the null hypothesis is rejected, affirming that the explanatory variables jointly exert a significant influence on the dependent variable, unemployment. In addition, the Durbin-Watson statistic, with a value of 2.156381, suggests the absence of autocorrelation, as this falls within the acceptable range for applied research without autocorrelation.

Upon examination of Table 4, it becomes evident that the estimates of the value of the total population, represented as POP, is statistically significant at all levels of significance because its probability value of 0.0004 is less than 1%, 5%, and 10% level of significance. The estimate exhibits a negative coefficient of 1.408989 with the unemployment rate during the evaluation period. This implies that a unit increase in the total population will bring about a 1.408989unitdecrease in the unemployment rate in Nigeria during the evaluation period. The coefficient of broad money supply (BMS) returns a positive sign of 0.010959 and it is statistically significant with unemployment at a 10% level of significance. Specifically, the result implies that a unit increase in broad money supply will lead to a 0.010959 unit increase in unemployment in Nigeria.

Also, the estimates of the inflation rate, represented as INF, is statistically significant at a 5% level of significance because its probability value of 0.0248 is less than a 5% level of significance. The estimate exhibits a positive coefficient of 0.003792 with the unemployment rate during the evaluation period. This implies that a unit increase in the inflation rate will bring about a 0.003792 unit increase in the unemployment rate in Nigeria during the evaluation period. Likewise, the exchange rate (EXR) returns a positive sign of 0.005079 and it exhibits a significant relationship with unemployment as its probability value of 0.0000 is less than a 5% level of significance. These results imply that a unit increase in exchange rate will lead to a 0.005079unit increase in unemployment in Nigeria.

The coefficients of interest rate (INTR) return a negative sign of 0.021695 and it exhibits a significant relationship with unemployment as its probability value of 0.0131 is less than a 5% level of significance. These results imply that a unit increase in interest rate will lead to a 0.021695 unit decrease in unemployment in Nigeria. Lastly, the estimates of gross fixed capital formation (GFCF) return a positive sign of 0.027599 and it exhibits a significant relationship with unemployment as its probability value of 0.0000 is less than a 5% level of significance. These results imply that a unit increase in gross fixed capital formation will lead to a 0.027599 unit increase in unemployment in Nigeria.

Table 5: Error Correction Result

Dependent Variable: D(UNPR)
Method: Least Squares
Date: 10/22/23 Time: 08:45
Sample (adjusted): 1990 2023
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POP)	-1.778629	0.659382	-2.697419	0.0129
D(BMS)	0.016068	0.009042	1.776916	0.0888
D(INF)	0.002411	0.001909	1.262802	0.2193
D(EXR)	0.004164	0.001052	3.957477	0.0006
D(INTR)	-0.022881	0.007930	-2.885576	0.0083
D(GFCF)	0.029978	0.008290	3.616192	0.0015
ECM(-1)	-0.237882	0.267162	-4.633447	0.0001
C	0.005896	0.026844	0.219657	0.8281

R-squared	0.670609	Mean dependent var	0.063161
Adjusted R-squared	0.570359	S.D. dependent var	0.174833
S.E. of regression	0.114598	Akaike info criterion	-1.277140
Sum squared resid	0.302051	Schwarz criterion	-0.907079
Log likelihood	27.79567	Hannan-Quinn criter.	-1.156509
F-statistic	6.689398	Durbin-Watson stat	2.166770
Prob(F-statistic)	0.000221		

Source: Author's computation (2023).

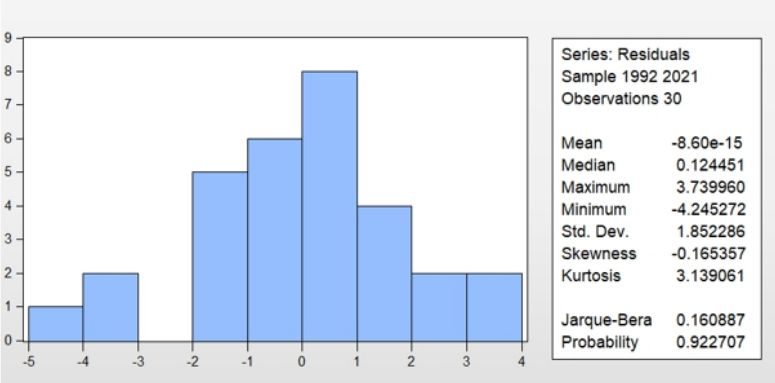
ECM: The sign of the short-run dynamic interactions is consistent with that of the long-run relationship. The estimated error correction coefficient of -0.237882, has the correct sign, and implies a very low speed of adjustment to equilibrium after a shock. Over 23% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year.

Diagnostic Tests

Normality Test

The models are examined for normal distribution. The Jarque-Bera (JB) statistics is used to test for the normality of the models. The null hypothesis is that the models are normally distributed. The decision rule is to reject the null hypothesis if the p-value is less than 0.05 level of significance.

Figure 1: Normality test of the models of the study



Source: Author's computation (2023).

In the figure above, the Jaque-Bera statistics are used to test for the normality of the model. The Jaque-Bera p-value of 0.922707 is greater than 0.05, thus, there is a normal distribution. That is, the study, therefore, accepts the null hypothesis that the model is normally distributed.

Stability Test

To determine the stability of the model, CUSUM and CUSUM of squares were used. The estimated model is stable if its recursive residuals lie within the two critical bounds. On the other hand, if residuals fall outside the two critical lines the model is said to be unstable. The results of the stability test are presented in Figures 2. The analysis in Figures 2 indicates the graph of CUSUM was stable because the recursive residuals fall inside the critical line while that of CUSUM of squares was unstable, meaning that they are outside the 5 % critical bounds. This result implies that the estimated parameters for the study are both stable and unstable for the period under investigation.

Figure 2: Plot of Cumulative Sum of Recursive Residuals
The straight
CUSUM RESULT

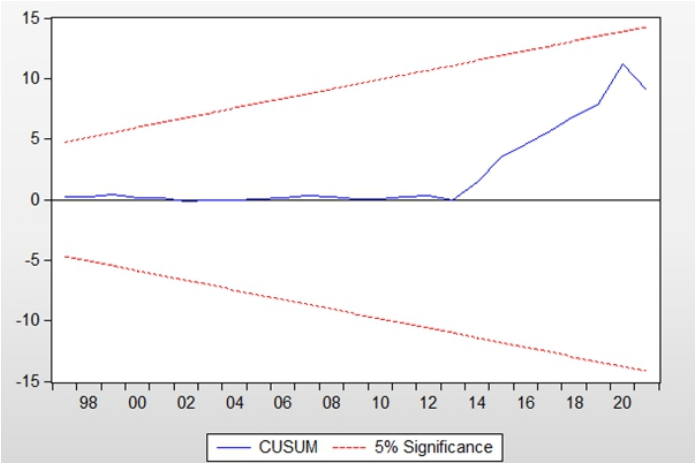
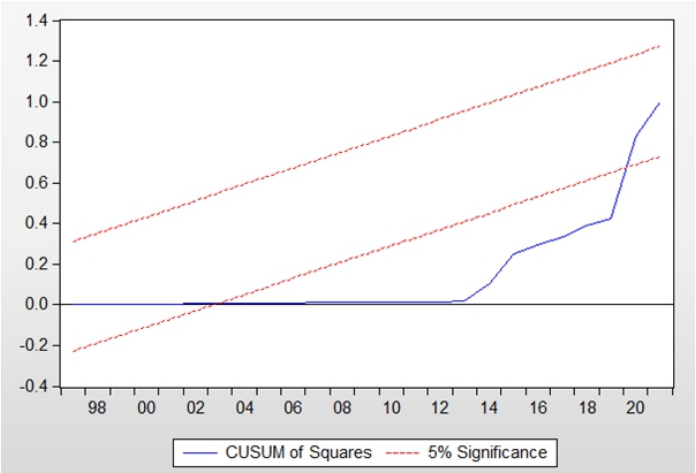


Figure 3: CUSUM of squares test
CUSUM OF SQUARES



Granger Causality

Cointegration between two variables does not specify the direction of a causal relation, if any, between the variables. Economic theory guarantees that there is always Granger Causality in at least one direction Order, D. and L. Fisher, (1993). Before the Granger causality test, we assume that the variables are stationary, and the residuals are uncorrelated. To examine the hypothesis of the Granger causality test, the probability values of the F-statistics are appointed. We accept the null hypothesis if the P-value is greater than 5% otherwise reject Ho. Hence, this aspect of the work seeks to verify the direction of Granger Causality between monetary policy and investment. Estimation results for Granger causality between the very variables are presented below:

Table 6: Causality Test Results

Pairwise Granger Causality Tests
Date: 10/22/23 Time: 08:59
Sample: 1990 2023
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
POP does not Granger Cause UNPR	30	5.90318	0.0079
UNPR does not Granger Cause POP		2.75849	0.0827
BMS does not Granger Cause UNPR	30	4.54843	0.0207
UNPR does not Granger Cause BMS		0.33194	0.7206
INF does not Granger Cause UNPR	30	0.86908	0.4316
UNPR does not Granger Cause INF		0.08925	0.9149
EXR does not Granger Cause UNPR	30	3.41190	0.0490
UNPR does not Granger Cause EXR		3.07249	0.0641
INTR does not Granger Cause UNPR	30	1.16185	0.3292
UNPR does not Granger Cause INTR		1.65119	0.2121
GFCF does not Granger Cause UNPR	30	6.19579	0.0065
UNPR does not Granger Cause GFCF		6.88573	0.0041
BMS does not Granger Cause POP	30	4.28141	0.0252
POP does not Granger Cause BMS		0.76200	0.4773
INF does not Granger Cause POP	30	0.67080	0.5203
POP does not Granger Cause INF		0.34321	0.7128
EXR does not Granger Cause POP	30	3.12875	0.0613
POP does not Granger Cause EXR		4.17368	0.0273
INTR does not Granger Cause POP	30	1.50161	0.2422
POP does not Granger Cause INTR		0.28927	0.7513
GFCF does not Granger Cause POP	30	1.39582	0.2663
POP does not Granger Cause GFCF		5.35819	0.0116
INF does not Granger Cause BMS	30	2.71938	0.0854
BMS does not Granger Cause INF		1.19910	0.3182
EXR does not Granger Cause BMS	30	1.21846	0.3127
BMS does not Granger Cause EXR		0.15784	0.8548
INTR does not Granger Cause BMS	30	5.52037	0.0103
BMS does not Granger Cause INTR		1.34787	0.2780
GFCF does not Granger Cause BMS	30	2.10337	0.1431
BMS does not Granger Cause GFCF		0.70819	0.5022
EXR does not Granger Cause INF	30	0.81975	0.4520
INF does not Granger Cause EXR		0.67167	0.5198
INTR does not Granger Cause INF	30	9.64381	0.0008
INF does not Granger Cause INTR		2.95164	0.0707
GFCF does not Granger Cause INF	30	3.42741	0.0484
INF does not Granger Cause GFCF		0.48689	0.6202
INTR does not Granger Cause EXR	30	0.89754	0.4203
EXR does not Granger Cause INTR		3.92054	0.0330
GFCF does not Granger Cause EXR	30	1.42646	0.2590
EXR does not Granger Cause GFCF		3.28076	0.0543
GFCF does not Granger Cause INTR	30	7.03753	0.0038
INTR does not Granger Cause GFCF		0.48222	0.6230

Source: Author's computation (2023).

From the table above, it was also observed that bi-directional causation exists between GFCF and UNPR, while uni-directional causation exists between BMS and UNPR; EXR and UNPR; BMS and POP; POP and EXR; POP and GFCF; INTR and BMS; INTR and INF; GFCF and INF; EXR and INTR; and GFCF and INTR.

Hypotheses Testing

The test of hypotheses will be based on the probability values from the OLS results.

H_{01}: There is no significant effect of money supply on unemployment in Nigeria

To examine the hypothesis of the significant effect of money supply on unemployment in Nigeria, the probability values of the T-statistics in the OLS test are appointed. We accept the null hypothesis if the P-value is greater than 5% otherwise reject Ho. From OLS test results, we find out that the probability of the money supply, 0.0959 is greater than 0.05, hence, we accept the null hypothesis, and reject the alternate hypothesis, that is, there is no significant effect of money supply on unemployment in Nigeria.

H_{02}: There is no significant effect of inflation on unemployment in Nigeria.

To examine the hypothesis of the significant effect of inflation on unemployment in Nigeria, the probability values of the T-statistics in the OLS test are appointed. We accept the null hypothesis if the P-value is greater than 5% otherwise reject Ho. From OLS test results, we find out that the probability of the inflation rate, 0.0248 is less than 0.05, hence, we reject the null hypothesis and accept the alternate hypothesis, that is, there is a significant effect of inflation on unemployment in Nigeria.

H_{03}: There is no significant effect of interest rates on unemployment in Nigeria.

To examine the hypothesis of the significant effect of interest rates on unemployment in Nigeria, the probability values of the T-statistics in the OLS test are appointed. We accept the null hypothesis if the P-value is greater than 5% otherwise reject Ho. From OLS test results, we find out that the probability of the interest rate, 0.0131 is less than 0.05, hence, we reject the null hypothesis, and accept the alternate hypothesis, that is there is a significant effect of interest rates on unemployment in Nigeria.

Summary of Major Findings

The Study examined the impact of monetary policy on unemployment in Nigeria. The explanatory variables are total population, broad money supply, inflation rate, exchange rate, interest rate, and gross fixed capital formation in Nigeria between the periods of 1990 through 2021 while the dependent variable is the unemployment rate. The study adopted an ex-post facto research design and used secondary data obtained from the CBN Statistical Bulletin and World Development Indicators. The study covered a period of 31 years (1990 to 2021). The data were subjected to the Augmented Dicker Fuller stationarity test to determine the best suitable econometric tool for analyses. The Ordinary Least Square (OLS) technique was used for the model estimation.

Conclusion

Findings show that broad money supply, inflation rate, exchange rate, and gross fixed capital formation have a positive and significant relationship with unemployment in Nigeria. While total population and interest rate have a negative and significant relationship with unemployment in Nigeria. The test of the hypothesis shows there is a significant relationship between interest rate, inflation rate and unemployment in Nigeria, while broad money supply has an insignificant relationship with unemployment in Nigeria. The Granger causality test shows that there is most of the variables have a unidirectional causation with only gross fixed capital formation and unemployment rate having a bi-directional causation with each other.

Recommendations

Based on the findings, the study offers some essential recommendations for government and policymakers in Nigeria on how to address the impact of monetary policy on unemployment.

1. Given that inflation has a positive and significant relationship with unemployment, policymakers should prioritize controlling inflation. To achieve this, the Central Bank of Nigeria should continue to use monetary policy tools like interest rates and open market operations to manage inflation within a target range. Maintaining price stability can help reduce the adverse effects of inflation on unemployment.
2. The positive relationship between exchange rates and unemployment suggests that exchange rate policies should be designed to promote stability. Reducing currency volatility and speculative pressures can create a more predictable economic environment, encouraging investment and job creation.
3. The negative and significant relationship between interest rates and unemployment implies that lower interest rates can stimulate economic activity and job creation. Policymakers should consider implementing monetary policies that support lower interest rates, especially in periods of economic downturn.
4. Lastly, Given the positive relationship between unemployment and broad money supply, which was found to be insignificant, it's important to focus on the quality of employment. Policymakers should promote programs that enhance the skills and employability of the labour force to ensure that the money supply effectively translates into job creation.

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Appendices

Data presentation

This chapter focuses on the presentation of data used in estimating the model as developed and enumerated in chapter three. The data were sourced mainly from World Development Indicators and CBN statistical bulletin from 1990-2021.

Table 1

YEAR	UNPR	GFCF	BMS	INF	EXR	INTR	POP
1990	3.978	53.1222	11.6354	7.3644	8.03829	25.3	2.6286
1991	3.978	48.4002	13.3999	13.007	9.90949	20.0417	2.5622
1992	3.931	43.7744	14.2474	44.5888	17.2984	24.7583	2.52373
1993	3.982	44.4764	15.7877	57.1653	22.0654	31.65	2.55577
1994	3.97	42.0678	15.0919	57.0317	21.996	20.4833	2.57483
1995	3.945	37.2059	10.2819	72.8355	21.8953	20.2333	2.55719
1996	3.898	36.5817	9.06333	29.2683	21.8844	19.8367	2.52685
1997	3.9	38.4223	9.72527	8.52987	21.8861	17.795	2.52296
1998	3.893	40.5534	10.939	9.99638	21.886	18.1842	2.51603
1999	3.901	38.278	12.7634	6.61837	92.3381	20.29	2.54262
2000	3.852	34.0493	14.6696	6.93329	101.697	21.2742	2.60287
2001	3.838	30.0379	15.901	18.8736	111.231	23.4383	2.65127
2002	3.751	26.7687	13.527	12.8766	120.578	24.7708	2.68289
2003	3.812	28.3709	13.0266	14.0318	129.222	20.7142	2.69277
2004	3.789	26.0633	11.7588	14.998	132.888	19.1808	2.6955
2005	3.807	24.9661	11.3005	17.8635	131.274	17.9483	2.69369
2006	3.803	26.1665	11.729	8.22522	128.652	16.8933	2.69593
2007	3.791	20.18	19.2911	5.38801	125.808	16.9392	2.70963
2008	3.782	18.8598	23.8119	11.5811	118.567	15.1358	2.71969
2009	3.763	21.1155	25.1442	12.5378	148.88	18.9908	2.72738
2010	3.755	16.815	21.3558	13.7401	150.298	17.585	2.74438
2011	3.77	15.6763	22.479	10.8261	153.863	16.02	2.76406
2012	3.75	14.2111	24.9282	12.2242	157.5	16.7917	2.74929
2013	3.7	14.1687	25.448	8.49552	157.312	16.7225	2.69747
2014	3.944	15.0835	22.6896	8.04741	158.553	16.5483	2.62812
2015	4.221	14.8272	22.3668	9.00943	192.44	16.8492	2.54119
2016	4.509	14.725	27.3788	15.6968	253.492	16.868	2.50703
2017	4.729	14.7156	24.7814	16.5023	305.79	17.5533	2.52732
2018	4.963	19.0184	25.3625	12.0951	306.084	16.9039	2.49664
2019	5.206	24.6252	23.9296	11.3964	306.921	15.3766	2.4482
2020	5.999	26.7442	25.2216	13.246	358.811	13.642	2.44061
2021	5.936	33.1074	24.8862	16.9528	401.152	11.4831	2.40636

Source: World Development Indicators and CBN Statistical Bulletin Various Years.

Table 1 depicts the annual time series data of the unemployment rate, total population, broad money supply, inflation rate, exchange rate, interest rate, and gross fixed capital formation in Nigeria between the periods of 1990-2021. The available data forms the basis for our test and analysis.